Planetary Radar

R. D. Shaffer and J. T. McCluskey
Control Center Operations Section

G. S. Downs
Communications Systems Research Section

This article reports on the radar astronomy activities supported by the Deep Space Network during the third quarter of FY81. The planet Mercury was the principal object of interest.

The 64-meter Goldstone station supported the observations of Mercury utilizing S- and X-band high-power transmitters (200 kW). The data have been edited, but have not been reduced to altitudes as yet. The estimate of the amount of useable data acquired vs the total obtained appears to be approximately 70%.

During the third quarter of FY81, the planet Mercury was observed on 10 different occasions during the latest inferior conjunction, primarily at 12.5-cm wavelength (S-band). This series of observations marks a return to Mercury after an absence of seven years and is the start of a long-term series of observations (1 to 10 years) to map the topography and scattering properties as completely as is physically possible. Currently, signal-to-noise considerations limit the coverage to between latitudes $\pm 11^{\circ}$, representing 18% of the surface.

Inferior conjunctions of Mercury occur about three times per year, allowing for considerable radar activity throughout the year. Due to considerable activity related to Venus and Mars, observations of Mercury will resume in April of 1982 with two observing sessions using two-element radar interferometer measurements designed to improve the precision with which the spin axis of Mercury is defined.